Scotland's National Nature Reserves

The Story of Noss National Nature Reserve

(2nd Edition)

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Scotland's National Nature Reserves
Magical places, amazing wildlife.

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The Story of Noss National Nature Reserve

Foreword

Noss is just one of the many islands that make up the archipelago of Shetland, the most northerly part of the British Isles, but it is a very special one. Lying on the same latitude as the southern tip of Greenland, Noss is one of the most accessible of the internationally important seabird colonies of the North Atlantic.

Noss owes its wildlife interest to the shaping of its coastline, from ancient origins to more recent erosion that has resulted in spectacular cliffs which are on the threshold of the rich and productive North Sea. Through a management agreement with the owner, the Gardie Trust, it has been a National Nature Reserve since 1955.

Noss is one of more than forty-five National Nature Reserves (NNRs) in Scotland. Scotland's NNRs are special places for nature, where some of the best examples of Scotland's wildlife are managed. Every NNR is carefully managed for both nature and people, giving visitors the opportunity to experience and enjoy our rich natural heritage. Noss is a renowned seabird island and a priority destination for visitors to Shetland.

This Reserve Story contains background information about the Reserve, describing its wildlife interest, land use history and management since it became a Reserve. Future management of the Reserve is outlined in the Noss NNR Management Plan 2014-2024.

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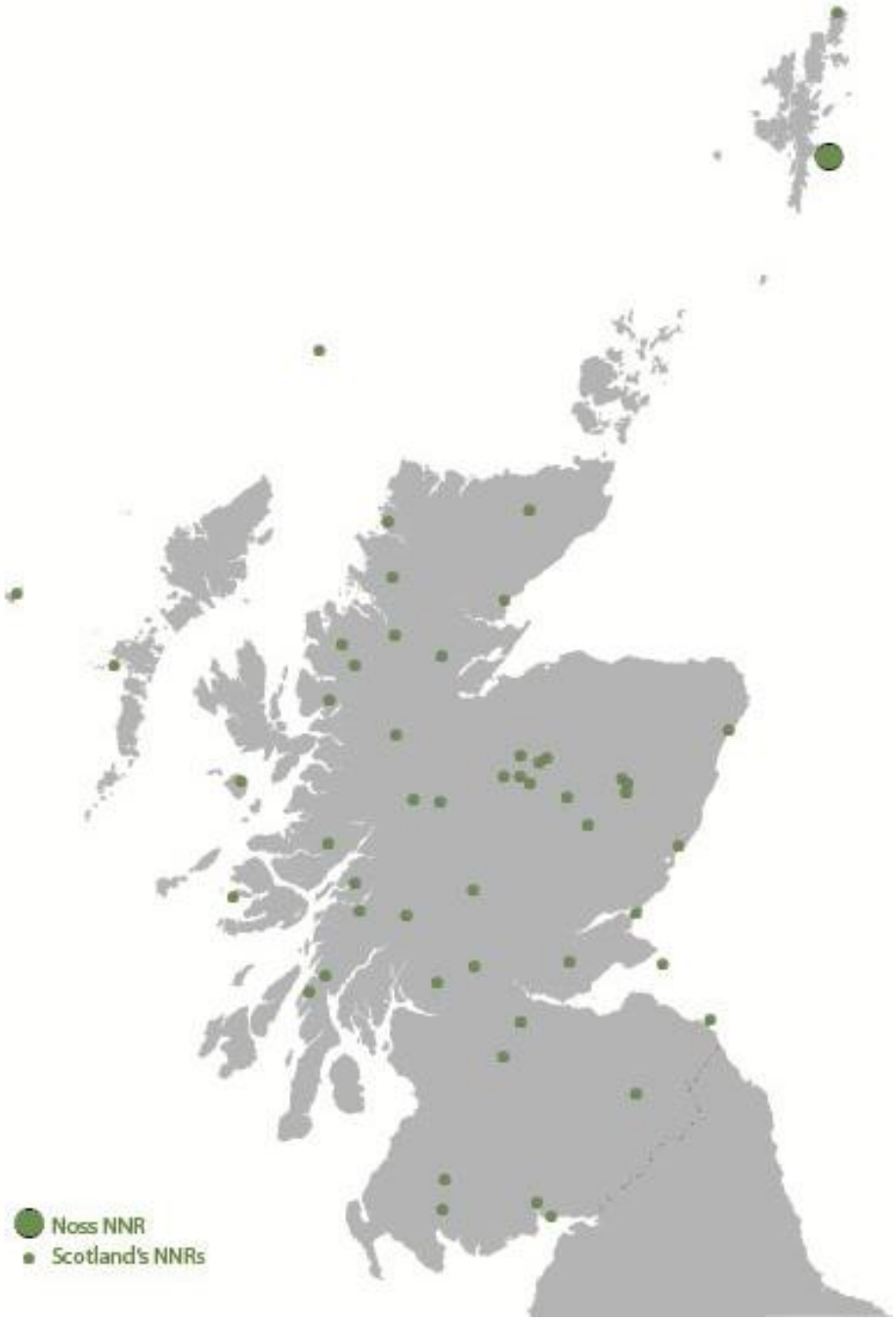
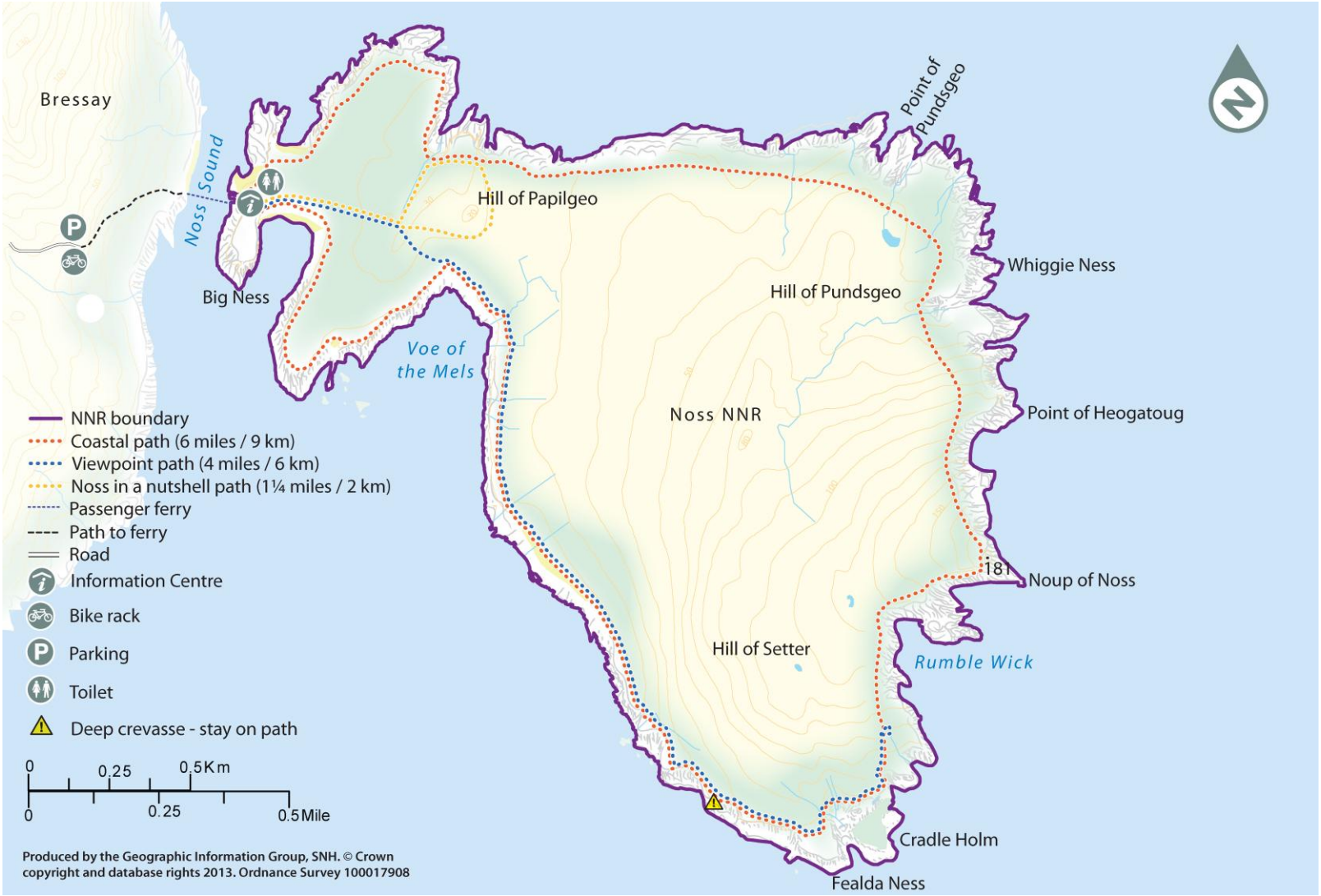


Reserve map


Bressay
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Passenger ferry
Path to ferry
Road
Information Centre
Bike rack
Parking
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Deep crevasse - stay on path
0 0.25 0.5Km
0 0.25 0.5Mile
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1 Introduction

The island of Noss lies to the east of the island of Bressay from which it is separated by Noss Sound, a strip of water some 150 metres (m) wide. The island covers some 344 hectares (ha) and is composed of almost horizontal beds of red, yellow and grey sandstones which have eroded to form a spectacular coastline with associated arches, caves and offshore stacks.

The island possesses a very distinctive outline, rising gradually from low lying land in the west to towering cliffs in the east, and reaches a maximum height of 181m above sea level at the famous Noup of Noss, a distinctive Shetland landmark. Found on these cliffs and the nearby moorland, is the primary interest of the Reserve - breeding seabirds: nearly 60,000 individuals of 13 different species breed on Noss, including the 5th largest great skua colony in the World and 7th largest UK gannetry.

The seabirds on Noss are highly concentrated within a spectacular and easily accessible landscape. The NNR has a very high profile - it is one of the key sites for tourism in Shetland. Several thousand people visit the reserve annually, either landing via the inflatable boat ferry across Noss Sound operated by Scottish Natural Heritage (SNH), or going around the island on commercial boat trips from Lerwick.

The low lying western section of the island comprises semi-improved grassland and is bordered by low lying rocky shores with three small sandy beaches. To the east of the Hill Dyke the vegetation is largely heath grading into blanket mire on the higher ground with areas of acidic grassland. The influence of salt-spray is strong and a band of maritime grassland of varying width borders the cliff tops.

The island has been settled by people for at least 4,000 years and has considerable archaeological interest. Today it is uninhabited except for the period from April to September when SNH seasonal staff live on the island.

Shetland lies close to the main depression track between Scotland and Iceland and a hyper-oceanic climate prevails, characterised by cool summers and relatively mild, wet and windy winters. The climate is cool, with a summer maximum average of 14^{o}C and a winter minimum average of 3^{o}C. Lerwick, 5 kilometres (km) from Noss, has an annual rainfall of about 1200mm and experiences over 40 gale days a year, with no month gale-free.

The seabird interests of Noss are of UK and European importance. The island is classified as a Special Protection Area (SPA) and is of European importance for the breeding seabird colony that it supports, with especially significant numbers of gannet, guillemot, fulmar, great skua, Kittiwake and puffin. The recognition of Noss as a European site of international importance means that it is part of a Europe wide network of areas referred to as ‘Natura’ sites which reinforces the message that it can be considered one of the best sites in Europe.

At a national level, the Reserve forms part of the Noss Site of Special Scientific Interest (SSSI). In addition to the breeding seabird assemblage, the numbers of gannet, guillemot, great skua, kittwake and Arctic skua are of national importance.

Table 1: Protected areas and features of Noss NNR

Protected Area	**Noss SPA** **European**	**Noss SSSI** **UK**
Species:		
Breeding seabird assemblage/seabird colony	✓	✓
Gannet	✓	✓
Guillemot	✓	✓
Fulmar	✓	
Great skua	✓	✓
Kittiwake	✓	✓
Puffin	✓	
Arctic skua		✓

Puffin

2 The Natural Heritage of Noss NNR

Geology

About 500 million years ago, Noss, along with Shetland and the rest of Scotland, was part of a supercontinent named Laurentia lying approximately 10 degrees south of the equator. Laurentia, which also included most of what is now North America and Greenland, was separated from the neighbouring continents of Baltic (Scandinavia and NW Europe) and Avalonia (Southern Europe) by the Iapetus Ocean. Around 420 million years ago, these three continents collided, creating a supercontinent with Scotland in its interior, and throwing up the Caledonian Mountains. Shetland now lay on the edge of a desert basin at the foot of the mountains.


The channel between Cradleholm and Noss

The climate was hot and arid, streams running down the mountain sides fed rivers running across the desert and short-lived lakes occasionally filled the basin. The streams carried eroded material down from the mountains and deposited it in the basin where some of it was picked up by the wind and transported further as mobile desert dunes. The great depth of sediment that filled the basin during the 50 million years of the Devonian, or Old Red Sandstone, period now forms the layer upon layer upon layer of sandstones and mudstones to be seen in the cliffs of Noss, neighbouring Bressay and several other parts of Shetland (and Scotland).

In the millions of years since their formation, these desert rocks have been submerged beneath the sea and then uplifted again by massive earth movements, all the while drifting northwards as the tectonic plate on which Britain sat brought Noss gradually north to its present position.

Once the old red sandstone of Noss was uplifted from beneath the waters and exposed to the atmosphere, erosion resumed its work, shaping the now familiar outline of Noss over the last 150 million years or so through the action of rain, wind and sea. Noss and Bressay would originally have been joined until erosion and rising sea levels divided them. Exactly when Noss Sound was formed is not known, but the Old Norse name “Noss”, meaning a nose, suggests a headland rather than an island, whilst records indicate that Noss has been an island since at least the 16th century. Erosion has also worked on a finer scale, weathering hard and soft layers of rock at different rates to form tier upon tier of ledges that now provide nest sites for seabirds.

Habitats

The lower lying western section of the island comprises semi-improved grassland and is bordered by low lying rocky shores with three small sandy beaches. To the east, beyond the Hill Dyke, the vegetation is largely dwarf-shrub wet heath grading into blanket bog and moorland on the higher ground and acidic grassland at the Hill of Setter, the Noup and Heogatoug. Upland heath vegetation is found on the thinner peat and there is coastal heath in areas such as Ousen's Pund. The influence of salt-spray is strong and a band of maritime grassland of varying width borders the cliff tops. The cliff vegetation, out of range of sheep, is strikingly colourful and diverse.

The intertidal areas around Noss range from near vertical cliffs to bedrock and boulders with sand/shingle beaches at Nesti Voe, Flitsand and Booth's Voe. Noss has an exposed coastline with the south and east coasts being very exposed to wave action. Exposed areas around Noss have distinctive zonation pattern of bands of lichens, barnacles and limpets at the top of the shore, leading to mussels and a band of coralline algae near the low water mark. Most of the sea caves and arches are found on the east coast of Noss.

Nesti Voe looking towards Gungstie

Birds

The history of the seabird colonies at Noss has been relatively well recorded. The Rev. J. Brand during a visit in 1701 described Cradle Holm as `much frequented by fowls more than any other place on the east side of Zetland', but it was not until the late nineteenth century that the first seabird counts were made. Since then most species have been counted with some frequency, particularly since the 1970s, allowing us an excellent insight into the changing fortunes of the different species and illustrating the dynamic nature of seabird populations. Seabird productivity has been monitored since the 1980s, allowing further understanding of seabird population changes.

The breeding seabird community on Noss has changed considerably over the last 100 years. The island has gained 4 new breeding species (gannet, fulmar, great skua and storm petrel) and lost 6 others (lesser black-backed gull, common gull, tree sparrow, whimbrel, peregrine falcon and white-tailed eagle) with dramatic increases in some species and population crashes in others.

The changing fortunes of Shetland's seabirds since the 1980s has been closely allied to the availability of sandeels in local waters during the bird breeding season. The dynamic nature of seabird colonies on Noss is demonstrated in the summary below. For a more detailed assessment of Shetland seabirds refer to Pennington e*t al* 2004 and Mitchell *et al* 2004 for a national perspective. Seabird monitoring data is supplied to the Joint Nature Conservation Committee and published by them in annual reports until 2006 (eg Mavor *et al* 2005, see http://www.jncc.gov.uk/page-3460). Now seabird trends are updated online at http://jncc.defra.gov.uk/.

Fulmar

Fulmars were first recorded breeding on Noss in 1898 at Papil Geo. The population then increased rapidly and by 1946 (more than1,000 breeding pairs). The population further increased to 6347 Apparently Occupied Sites (AOS, roughly equivalent to pairs) in 1987. Counts since show the population has declined and stabilised at some 5000 AOS (5248 in 2011). There has been a corresponding decline in productivity since the late 1980s. Numbers have stabilised at all the main UK fulmar sites. About 10% of the world population breeds in the UK.

Gannet

Prospecting gannets were noted on Noss in 1911-12 with the first pair breeding on the Noup in 1914. There must have been substantial immigration to sustain the steady increase that followed as by June 1939 there were 1,830 pairs. The population has continued to expand, as it has done at all UK gannet colonies. There were 9767 Apparently Occupied Nests (AON) in 2008, around 4% of the UK total. The UK is especially important for gannets – nearly 60% of the world population breed here. Gannet breeding success has been monitored on Noss since 1980 and has been high (mean 0.72/AON 1980-2004).

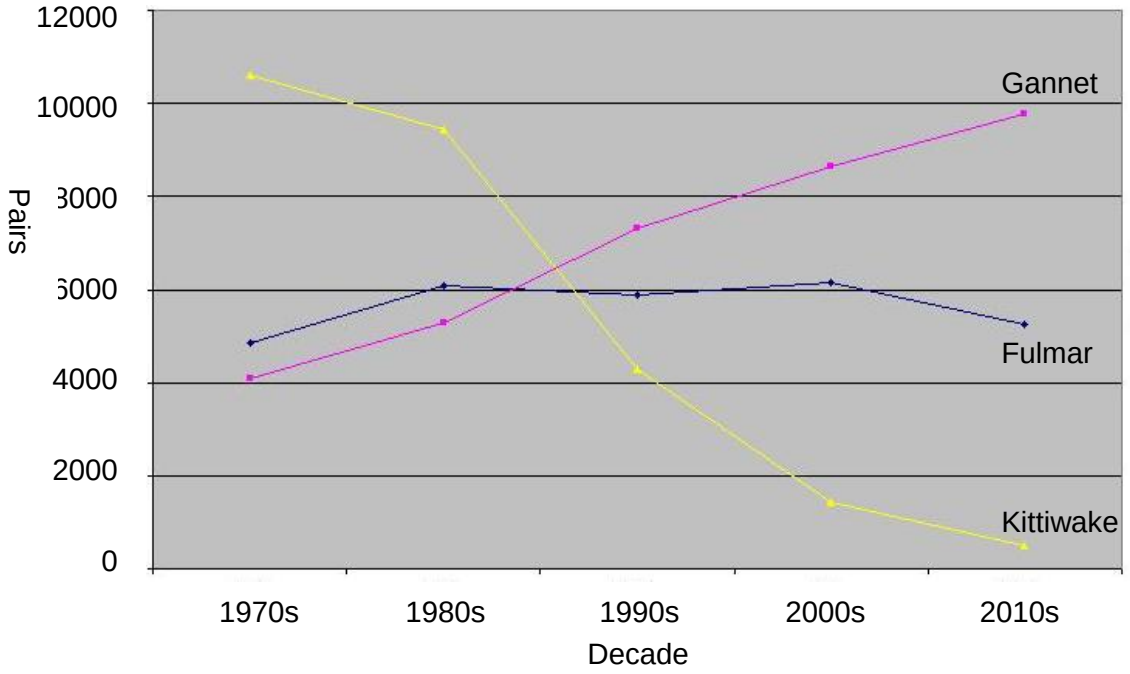
Kittiwake

Noss was considered to be one of the main kittiwake breeding stations in Shetland in the late 19th century. The first population estimate was 10,510 nests in 1969.

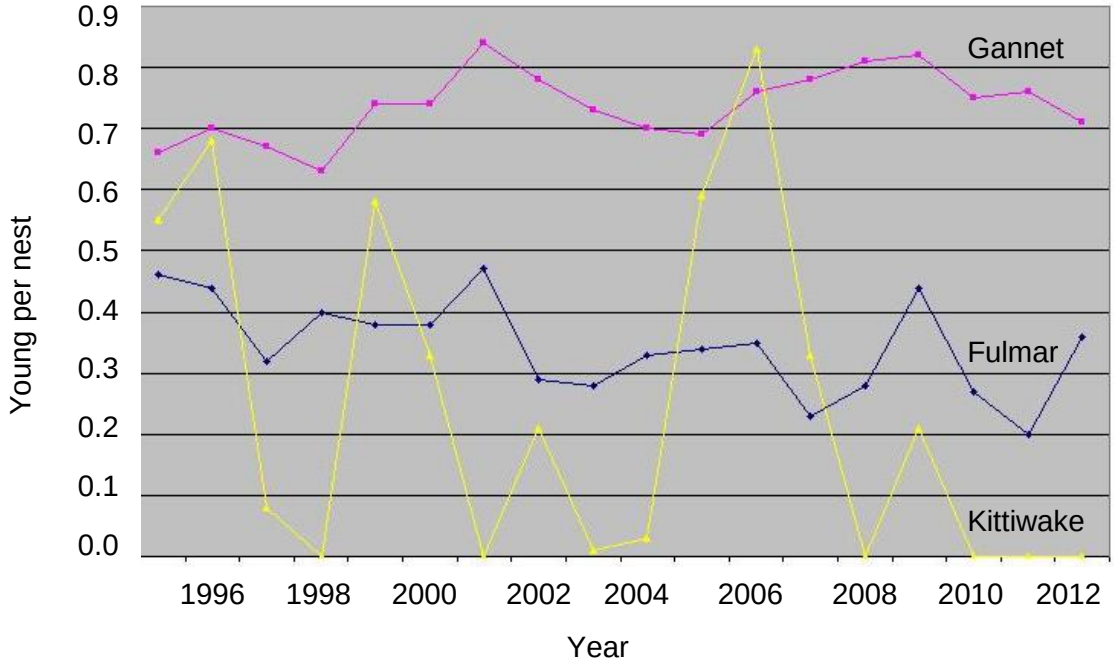
Since 1980 there has been a dramatic decline in the breeding population. In 1980, 11,050 breeding pairs were counted, by 2005 this had fallen to 1427, and by 2011 down to 507 AONs a more than 90% decrease. This decline is considered to have been due mainly to two, possibly related, factors. Firstly a series of poor breeding seasons, most probably a result of reduced sandeel food supply which resulted in few new recruits to the population. Secondly, the numbers of eggs, chicks and even possibly adults taken by great skuas has increased, resulting again in lower recruitment and perhaps higher adult mortality.

Breeding success has been monitored since 1980 and, has, as throughout Shetland, been very low since 1985 with several years of almost total breeding failure. Nationally, kittiwake numbers have also declined. Though there is substantial regional variation.

Seabird populations on Noss since 1970



Productivity of Seabirds on Noss 1995 - 2012



Great skua

In 1774 the great skua was known to breed at only two Shetland sites in the British Isles: Foula and Unst. At this time they were popular with landowners as they could drive off white-tailed eagles, thus considered to protect sheep on hill land. So much

so that attempts to initiate breeding on Noss were made in 1890 by placing eggs from Foula into gull nests. The attempts failed but in 1910 the first 2 pairs successfully bred at the Hill of Setter. By 1946, 113 pairs were present (representing an annual population growth of about 3%). The rate of increase then rose to about 6% per year, with 242 pairs counted in 1974 and 388 pairs present in 1983.

Great skua

Since 1983 the population seems to have remained fairly stable at around 400 Apparently Occupied Territories (AOTs). 432 AOTs in 2001 represented 4.5% of the GB population and the World's 5th largest colony. Recent productivity has been low (2001-05 mean 0.29/AOT) with the last whole island count recording 365 pairs in 2007. Shetland is the stronghold for great skuas in the UK and all the other long-established colonies here have, as on Noss, reached an equilibrium or have decreased since the mid-1980s. The UK holds 60% of the World's breeding great skuas and all but one pair is in Scotland.

Guillemot

Several visitors in the late 19th century indicated that only Foula and Unst rivaled Noss for guillemots. They are an awkward species to count. Detailed and methodical counts have only been made since 1969 and indicate that the population reached a recent peak around 1981, when over 65,000 adults were attending the colony. After a subsequent decline to 37,680 in 1986 numbers increased to 45,777 in 2001, but with the latest decline in sandeel availability bird attendance has been low – just over 22,000 individuals were counted in 2009. The Shetland population has shown the same trends as on Noss, though numbers elsewhere in most of the UK continue to increase. Guillemots are the most numerous seabird in Britain, about 12% of the world population breeds here.

Puffin

Various authors up to 1955 considered Noss to be one of the largest puffin colonies in Shetland, but whether this was just a misjudgement or the numbers on Noss have subsequently declined is unclear. Most of the more recent May counts have been of around 600 individuals. A notoriously difficult species to census, there is some evidence that numbers at some Shetland colonies, including Noss, have decreased in recent years, though they have increased throughout most of the UK since 1970.

Arctic skua

There are conflicting reports of the number of pairs present at the end of the last century, with two references to about 50 pairs, but one of some 300 birds. Subsequent population estimates to the 1970s ranged from 17-60 pairs but did not perhaps suggest any significant population change. Since 1974 numbers have decreased, initially with a concurrent increase in breeding density, to just two pairs in 2011. This is undoubtedly linked to the expansion of the population of great skuas - through competition for optimum nesting habitat, direct predation and other interactions such as fragmentation of Arctic skua breeding sub-colonies. Recent productivity has been very poor and it might be that Arctic skuas cease to breed at all on Noss in the near future. The majority of the UK's Arctic skuas breed in Shetland and Orkney and here they have declined rapidly since 1985.

Shag

Perry (1948) estimated that 100 pairs of shags were breeding on the island in 1946 but the first detailed census did not occur until 1969 when 141 nests were counted. In 1983 148 nests were counted but then the population declined steadily until the 1990s with 72 nests found in 1995. The number of nests counted has fluctuated quite widely since then (eg 47 in 2003, 75 in 2013). Nationally, shag numbers are stable although the overall Shetland population has declined since 1970.

Gulls

Early accounts of breeding common gull on Noss estimated as many as 30-40 pairs at North Croo. Perry reported 13 pairs on Big Ness in 1946. The breeding population peaked at 20 pairs in 1975 but by 1977 had fallen to just 2 pairs. There was only one breeding attempt during the 1980s and between 1 and 4 pairs annually from 1991-1993. Since 1994 however there have been no breeding attempts.

Lesser black-backed gull also no longer breeds on Noss. Perry estimated that 100 pairs bred on the island in 1946 but this had decreased to 30 by 1969 and 7 by 1975. The last breeding record was in 1983. The overall Shetland population has declined since 1970.

A similar decline has been recorded for herring gull and great black-backed gull. Early accounts suggested more than 1,000 pairs of herring gull bred on the island. There were still "several hundred pairs" breeding in 1946 according to Perry, but by 1980 the population had declined to 182 pairs. The decline has continued in recent years and there were just 72 AOTs in 1995 and 23 in 2004. Since then the population has remained between 22 and 33 pairs. Recent productivity has been lower than that recorded in the 1980s-90s.

Likewise for great black-backed gull, in 1887 and 1898 Cradle Holm was considered to represent the largest colony in Shetland with numbers of up to 250 pairs quoted. Perry considered there to be about 150 pairs in 1946 but subsequent counts up to the 1970s estimated between 200-300 pairs. Recent annual counts indicate a steady decline, reflected throughout Shetland, from 199 pairs in 1980 to between 50-60

pairs, and although there were 77 pairs in 2005, numbers have continued to decline to only 11 pairs in 2012.

Arctic tern

Breeding numbers on Noss have fluctuated, as is typical for this species in Shetland – in some years over 200 pairs have nested, often there are 60-90, but occasionally none at all. Breeding success is highly variable and is often associated with availability of sandeels. 10 pairs nested in 2012 the highest number for several years, although productivity was very low (0.1 young per pair).

Razorbill

Perry indicated that razorbills were "few in number" in 1946. Whole island counts have varied from 3120 individuals in 1969 to 558 in 2007, but there were 1984 birds present in 2001. As with guillemots, recent numbers have been low due to low sandeel availability. It must be noted that some razorbills nest in crevices and can easily be hidden during counts. Most of the large Shetland colonies are declining, though the UK population is increasing overall.

Razorbill with guillemot in the background

Black guillemot

Recent whole-island counts of pre-breeding adults suggest the population may have increased slightly during the early 1980s to some 140-150 individuals, but since the mid-1990s has been around 105-115 individuals. Counts in a study plot on Noss (which holds around half the island population) reflects this decreasing trend. The decrease has also been noted in most of Shetland and the north of Scotland, though numbers are stable in the UK overall. Shetland still holds over 40% of the UK's breeding black guillemots.

Table 2: Most recent whole island seabird counts

Species	Population size	Year	Species	Population size	Year
Fulmar	5284 AOS	2011	Gt Black-back gull	11 AON	2012
Gannet	9767 AON	2008	Kittiwake	507 AON	2010
Shag	63 nests	2012	Arctic tern	10 pairs	2012
Arctic skua	1 AOT	2012	Guillemot	22,065 indiv	2009
Great skua	367 AOT	2007	Razorbill	558 indiv	2009
Herring gull	26 AON	2012	Puffin	1031 indiv	2005

Other birds

In all 201 bird species have been recorded on Noss. This includes a variety of breeding waders with 3 pairs of dunlin, 9 pairs of snipe, 15 pairs of oystercatcher and 4 pairs of ringed plover breeding in 2012. Curlew, lapwing and golden plover also hold territories in most years but often do not remain long enough to breed. It is probable that the high density of great skuas breeding on the island has prevented these species from establishing themselves as regular breeders. About 25 pairs of eider also nest on the NNR and in autumn a moulting flock of eiders used to be regularly seen between Noss Sound and the north end of Bressay. The distribution of moulting eider flocks has changed in response to location of mussel farms and this flock is no longer regular around Noss.

One pair of red-throated divers has bred successfully in past years, but although they have nested recently there has not been a successful nest since 2002.

Other breeding birds include raven (3-4 pairs), twite (usually 5 pairs), wren (of the Shetland subspecies - 16 pairs in 2012), skylark (87 pairs in 2008), meadow pipit (c40 pairs), rock pipit (c26 pairs), wheatear (20-30 pairs), blackbird (1 pair in 2012). House sparrow used to breed regularly but has not nested since 2005.

Mammals

Grey seals and common seals are recorded regularly in small numbers, often hauling out on exposed rocks and otters are frequently seen on land and close inshore. Grey seal pups were recorded for the first time in 2005 but otters do not breed here. Rabbits, introduced centuries ago, are very common.

Ten species of cetacean have been seen from Noss, including killer whale and sperm whale, but the most commonly recorded is the harbour porpoise.

Though obviously outside the NNR boundary these sea mammals can be an important part of visitors' experience of Noss.

Sperm whale

Invertebrates

Certain groups of invertebrates are better recorded than others at Noss. So far these do not include any scarce or UK Biodiversity Action Plan (UKBAP) species: 45 species of moth, 107 species of spider and 148 species of beetle have been recorded.

Over 100 animals have been recorded in the inter-tidal areas of Noss. The community of the steep slopes is dominated by the soft coral dead man's fingers and sea urchins. Where the slopes shelve into bedrock or boulder plains, species such as brittlestars occur, with squat lobsters found hidden in crevices. Barnacles and mussels are common at the entrances to the sea caves on Noss, whilst the inner walls are dominated by filter feeding animals adapted to the surging water. A range of colourful anemones, such as plumose, jewel and daisy, and feather stars can be found.

Plants

137 vascular plant species have been recorded on Noss, including two nationally scarce species - small adder's-tongue and northern knotgrass. The display of common flowers such as red campion and buttercups, especially on the ungrazed areas, is an impressive spectacle.

Lousewort

Lichens are abundant, especially on cliffs and rocks, whilst encrusting coralline algae dominate the steeper intertidal slopes and sea cave entrances. The lower plants and fungi are under-recorded with 25 fungi & lichen species, and 44 mosses & liverworts identified. *Lecanora straminea* is an example of the potential richness of Noss for lichens – found on the wall by the Noup, this nationally rare species is an Arctic-maritime specialist near its southern limit in Europe. Another nationally scarce lichen, *Lecidea diducens* is also found on Noss. There are also over 30 species of algae, mostly in the inter-tidal areas.

Archaeology, History and Cultural heritage

Noss has a rich cultural heritage. Although Mesolithic 'hunter-gatherers' arrived in Shetland as long as 6000 years ago, the earliest evidence for people on Noss are remains of probable Neolithic or Bronze Age buildings at the Voe o' da Mels and a Bronze Age burnt mound further to the south at Hellia Cluve. A burnt mound is a

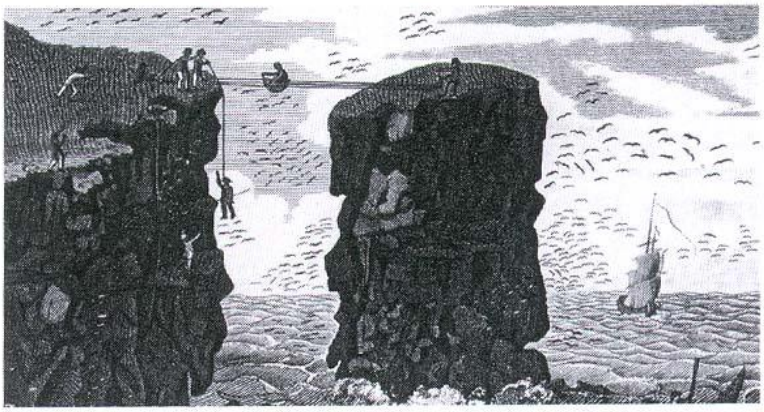
distinct mound of discarded baked stones which were probably used to heat water, perhaps for cooking.

The cultural evolution of Noss, and Shetland as a whole, was punctuated by two major events in the first millennium AD. Firstly, a pagan but sophisticated Pictish culture was changed by the arrival of Christianity in the 6th century from its Scottish roots on Iona. Excavations of the chapel area have suggested an early Christian shrine from the 7th-8th centuries, and Noss may have been a very important place at that time. The graveyard here, its outline still visible, seems to have been in use for over a millennium. The site of the chapel and burial ground at Big Ness, is a Scheduled Ancient Monument

The second major event was the arrival of the Vikings, probably in the late 8th century. The Norse all but obliterated the Picts, supplanting the original place names with their own, such as Papa, voe (bay), wick (wide bay), ness (headland), geo (small inlet), berg (rock) and noup (high cape). Evidence for the presence of a Pictish Christian community lies in the name the Vikings gave to Papil (*priest*) Geo on the north coast.

Noss has not always been a haven for seabirds. In 1633 a cradle was strung from ropes connecting Noss to the detached stack of the Holm of Noss. At first this gave islanders access to gulls' eggs, but later a larger basket provided carriage for up to twelve sheep. The cradle operated for over 200 years and numerous sketches and narratives were made by visitors and passing mariners. One notable visitor attracted by the cradle was Sir Walter Scott in 1814. The chicks of the Noss peregrine falcons were also often taken for the Royal Mews in the 19th century, having been famed, along with Fair Isle birds, by falconers for three centuries.

The 18th and 19th centuries were the period of the far haaf (deep sea) fishing. Noss was one of the 20 or so sites where fisherman based themselves in the summer months, often rowing up to 40 miles offshore for ling and cod.



Artist sketch of the cradle at Noss

The renowned Londonderry, or Maryfield, Stud was established in 1870 and for the next 30 years provided high quality, black colts for use in coal mines, with the mares stabled on Noss and the stallions on Bressay. All of the ponies registered with the Shetland Pony Stud Book Society descend from Lord Londonderry's famous stallion Jack 16 of Noss. Noss house (Gungstie, also known as Hametoun), the pony pund, corn kiln and boundary walls are now identified as Listed Buildings (Category B).

3 Management of Noss before it became an NNR

Land use history

There is no detailed information on the land management history of Noss before the 15th century, when Noss formed part of the Shetland estate of the Norwegian landowner Sigurd Jonsson. He died c1450 and later descendants sold the island to the Company of Copenhagen, a Danish trading company, in the early 17th century which subsequently sold it to a Shetland landowner in 1660. In the 1670s Noss was bought by the Mouats of Garth and the island has since been part of the Garth Estate.

In 1633, Robert Monteith described Noss as "a pleasant island for the most part covered with grass and stored with bestial". Clearly, there was not a great deal of arable land but there were cattle as well as sheep, and there would have been ponies to bring back peat from the hill. The remains of several centuries of peat digging are evident around the Hill of Pundsgeo, the last peats being cut in 1968.

Setter with Bressay in the background.

In the 1700s, the coastal strip to the west of Setter (*Saetr* is old Norse for summer pasture) was improved for agriculture by ridge and furrow ploughing and later connected by a stone road to the largest area of improved ground at Nesti Voe. By 1774 the island was reported to be covered with verdure and well cultivated. in 1871 Setter held 21 of the island's 24 inhabitants.

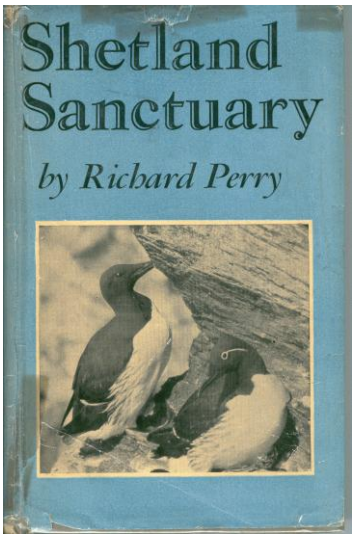
In the 19th century a Hill Dyke was erected between Voe o' da Mels and Geo of North Croo and today this wall separates the in-bye land from the rough hill ground. A smaller cliff dyke running from Geos of Hovie to Pundsgeo was built in the 1860s to prevent grazing animals from falling over the cliffs, but it has not been maintained since 1939. It also prevented stock access to Ousen's Pund and Big Pund, allowing hay to be grown here. Corn was also grown on the island, being dried in the beehive-shaped kiln at Noss Sound and ground in the water mill at the Voe o' da Mels. This was still working in the1850s though it had ceased to by 1869.

Prior to 1870 the island was let as two separate farms but around this date the tenancy agreements were terminated and the island let as one farm to the 5th Marquis of Londonderry, For the next 30 years up to 200 Shetland pony mares were grazed. The Setter folk had to leave and as the human population declined the once abundant brown rat became extinct on Noss. By 1901 most ponies had been removed from Noss as the market for them declined, the Manson family were granted the lease and the island was run as a sheep farm.

In 1904 a flock of black-faced sheep was introduced, tended by the Jamieson family, the last permanent residents. Members of the family rowed visitors across Noss Sound for a small fee.

The Royal Society for the Protection of Birds (RSPB) commenced a “Watcher” Scheme for the protection of important UK bird sites in 1905 with the first Watcher on Noss, Thomas Laurenson, appointed in 1907, followed by JW Jamieson in 1917.

The Jamiesons left Noss in 1939 when the black-faces were replaced by 450 hardier, more independent Shetland sheep. These were attended seasonally by the Sutherland brothers, who also rowed over visitors and acted as RSPB Watchers. Cattle were present during the summer until the Sutherlands relinquished the tenancy in 1969.



The seabird population at Noss was first studied by Richard Perry who stayed on Noss studying seabirds in 1946-47 and published his experiences the following year in “*Shetland Sanctuary*”.

Noss was selected as one of the proposed National Nature Reserves in Scotland in a Government Report of 1949. On 26th September 1955 and in agreement with the Garth Estate, this status was confirmed – in official parlance, Noss was declare” a NNR, only the 4th in Scotland.

4 Management of Noss NNR

Key events in the history of Noss since it became a NNR are as follows:

1955	Noss NNR declared. Sutherland brothers are grazing tenants with Lolly Sutherland and family residing on Noss during summer until 1969. During this time, Lolly continues as RSPB Watcher with Nature Conservancy (NC[1]) paying for his Honorarium. He later also acts as part-time Warden for Nature Conservancy. Reserve management split between visitors (RSPB) and scientific work (NC).
1958	First Noss Management Plan approved
1966	Noss visited as part of Scottish Bird Islands Study Cruise – visitors include Roger Tory Peterson, James Fisher, George Waterston, Joe Eggeling.
1967	First Shetland-based NC staff employed – duties include NNR management.
1969	First complete counts of guillemots and kittiwakes.
1970s	1970-73 RSPB employ summer warden, co-funded by NC. Complete counts of seabird species 1970. Increasing Great Skuas begin to impact on sheep drives.
1973	Myxomatosis first appears on Noss: this reduces demand for rabbits, previously caught in winter for game dealers south. Ironically, rabbit population explodes as numbers caught is reduced.
1974	NCC responsible for entire Noss management and directly employ warden.
1975	Seabird productivity monitoring commences, further expanded 1980s. Zodiac inflatable boat used for Noss ferry – same model still used today. New interpretation in Visitor Room. 200m National Grid markers established.
1977	Two seasonal staff people employed, warden and boat operator. In 1990s becomes 2 posts that share all island duties.
1982	Isle of Noss booklet by warden David Butler published by Garth Estate.
1983	Renotification of SSSI recognises split between areas of primarily agricultural interest and conservation interest.
1984-6	Major building works to Noss house, kiln etc. Metal walkway established at Noss Sound. Flush toilet and piped water supply from Whilloquoy installed.
1987	Great skuas last culled (5 pairs shot, under licence, at Setter).
1986	First special Noss Open Day, great skua disturbance trial at Setter reduces breeding attempts and productivity but proves labour intensive.
1987	Waymarking to minimise visitor interaction with Arctic Skuas/terns.
1988-9	Big Pund walled off, Ousen's Dyke rebuilt to prevent stock grazing.
1989	Last feral cat seen (controlled since 1987). New interpretation in Visitor Centre.
1992	Aerogenerator erected, electricity later enhanced by solar panels in 1997.
1994	Agreement with Estate to reduce sheep numbers to 350 from 400 ewes

[1] Nature Conservancy (1949-73) and Nature Conservancy Council (1973-92) are predecessors to Scottish Natural Heritage

	to enhance heathland. First Honorary Warden appointed.
1996	Sheep exclosure monitoring plots established on heathland and blanket bog.
1999	Extensive overhaul of interpretation in Visitor Centre.
2005	50th anniversary of NNR – special Open Day with some past wardens in attendance, new Noss booklet and other interpretation/commemoration.
2009	New concrete jetty constructed on Bressay shore to improve access
2011	25th Noss Open Day held – now part of the Shetland Nature Festival

Management of the natural heritage

Past management plans

Noss NNR Management Plans, which detailed objectives for the following 5 years or so, were produced in 1957, 1964, 1972, 1978, 1990, 1995 and 2007.

As would be expected, past plans have at their core the protection and maintenance of the breeding seabirds, although there has been a subtle change of emphasis in the reasons for doing so, as would be noted at other NNRs of this vintage. The protection of seabirds to allow for research and science are main justifications in the earlier plans, with “at least as much public access as at present” stated under “other objectives”. An intriguing and later redundant objective of the first two plans was to maintain the colony of rabbits as an example of an ancient population unaffected by myxomatosis (the disease arrived in 1973). There is also an understandable emphasis in the early Plans on recording biological interest, but in some ways the most startling difference with later Plans is the acceptance that control of some species, notably of the great skua and great black-backed gull, may be necessary to preserve numbers of other bird species. With the ferry operation more established, visitors increased, as did the profile of management for visitors within the Management Plan: the 1972 Plan now facilitated public access rather than just allowed it. It also noted that many of the ambitious seabird research proposals had yet to be started.

There was a distinct change in the 1978 Plan which established what would now be recognised as zoning policies: in most areas control of seabird populations would not be permitted, but the spread of great skuas to the Setter banks or to the west of the Hill Dyke would be controlled. The central “no entry” area, still in use today to reduce bird disturbance, was explicitly stated in the Plan for the first time. The Plan also contained the first reference to maintaining the skua breeding habitat and also a forward-thinking, if ambitious, objective to give protection to the local inshore food supply. There was provision for both interpretation and promotional materials and educational use of Noss was to be encouraged.

The 1990 Plan separated objectives into species, habitat, research & survey, interpretation & education and other, and this remains more or less still the basis of reserve Management Plans today. There was a presumption against intervention in natural processes though “appropriate steps” were to be taken to maintain the declining breeding population of Arctic skuas. Habitats should be diversified by appropriate habitat creation. Research was to be targeted towards that which

assisted reserve management: the inshore food supply, breeding productivity & population changes as well as improving natural history knowledge. However, the Noss ferry service and public use of the NNR was still a factor influencing ideal management rather than an objective in its own right.

The 1994 Plan confirmed the non-intervention management of the seabird colonies and the importance of good condition great skua habitat. The provision of the ferry service was now an objective of the NNR, and public use of Noss from the commercial boat operators was recognised. The need for research to assess the impact of great skuas on other seabirds on Noss was identified.

In 2007 the plan for the next 5 years had a much more diverse approach (or rather lack of focus). It included proposals to grow crops on Noss to improve the range of habitats for local Biodiversity Plan species, and also to create wet tussocky grassland suitable for breeding waders near the hill dyke, but neither of these were ever implemented. One option also discussed was the provision of artificial natal holts for otters which at the time did not breed on Noss. It is now thought that breeding occurs fairly regularly on Noss and there is no requirement for artificial holts. Management of the trees planted by volunteers in 2006 was to be maintained and more extensive recording of a range of habitats and species (such as previously under-recorded invertebrates, and mapping of heath and cliff habitats) was proposed. The core projects remained the non-intervention for nesting seabirds and the supporting access and information for visitors wishing to come on to Noss.

Species and habitat management

With the exception of rabbits, which are controlled by winter shooting, there is no direct species management on Noss today. Disturbance of nesting birds by visitors is minimised by information provision and waymarking if necessary. Habitat management is restricted to ensuring that the stock grazing level, particularly on the moorland, is sustainable and to maintaining ungrazed headlands, such as at Papil Geo, for flowering plants. One of the small lochs occasionally used by red-throated diver was previously dredged out by hand, but breeding has not taken place for some years.

The requirements of sheep farming on Noss influences the habitat management options. Prior to lambing, which on Noss is as late as mid-May, ewes are collected onto the improved grassland west of the Hill Dyke. This enables easier shepherding and reduces interaction with the great skua colony but also creates a high, if temporary, grazing intensity and disturbance effect. The minimisation of sheep and sheepdog interactions with the large great skua colony during lambing is crucial to the successful integration of wildlife and farming on Noss but it may also limit biodiversity improvements in this area west of the Hill Dyke if they impact on the area available for grazing.

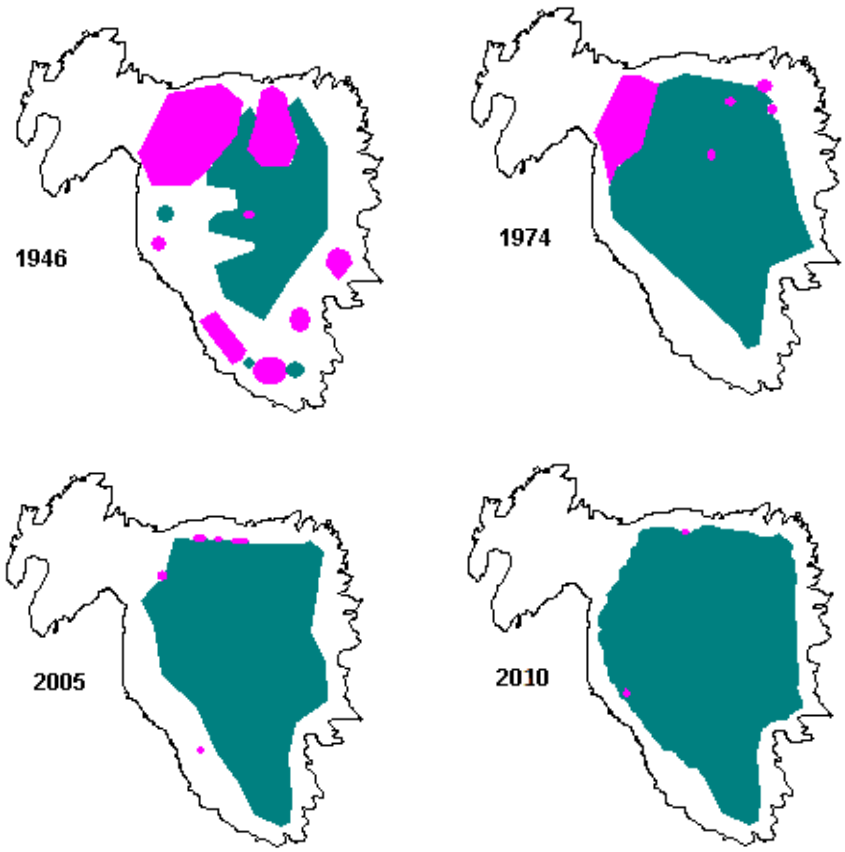
Non-intervention: the great skua debate

The predominant objective of previous Management Plans has been non-intervention. However the issue of the impact of the great skua population on other species, particularly Arctic skuas and kittiwakes, has been a constant. Great skuas

are legally protected and are a feature of European importance thus discussion of management measures may be of limited value. Nonetheless a summary of the current non-intervention rationale is useful.

To greatly simplify the situation, there is some evidence that Arctic skuas have been displaced from part of their breeding grounds on Noss over the last 50 years or so by the expanding great skua population (figure 1).

Figure 1: Change in distribution of Great Skua (Green) and Arctic Skua (Pink) between 1946 and 2010



Great skuas are bigger and more aggressive and able to defend territories from Arctic skuas. In addition, there is some direct predation of Arctic skuas, particularly of recently fledged chicks, by great skuas. Great skua predation of kittiwakes has also been a factor in kittiwake decline on Noss and elsewhere in Shetland. There is probably a fairly complicated relationship between the intensity of great skua predation, which has increased since the 1980s, and the reduction in the availability of sandeel stocks over more or less the same period. Sandeels are an important food item for both great skuas and their avian prey such as Arctic skuas and kittiwakes. When sandeel availability declined it had a twofold effect on these species and some other seabirds. A direct effect was to reduce their productivity through lack of food. At the same time, there was an indirect effect. These birds had to forage harder to feed themselves and their young, causing lower parental attendance at nests and young. Another consequence may have been that great

skuas, which are generalist predators, increasingly turned to predating Arctic skua, kittiwakes etc. rather than taking sandeels. Put these two things together and the stage was set for other seabirds to be a far more important component of great skuas' diet than previously. The net effect was a further decline in productivity. It is notable that at some great skua colonies, and probably at Noss also, cannibalism by great skuas, mostly of young by adults, also increased over the same period. The mechanism was probably the same mix of food shortage and lower parental vigilance.

One view is that this change is a natural response to fluctuating conditions, albeit that the cause of changing marine ecosystems may not be natural but substantially influenced by humans, and that this justifies non-intervention. However, we could also consider global significance of the species involved: the UK holds 60% of the World's great skuas but, at the most, only 9% of the kittiwakes and 2.5% of the Arctic skuas. It could be hard to justify control measures because it can be argued that it is more important to protect great skuas than others for which Noss is less important.

Also, what are future population trends likely to be? Great skua population counts since the 1980s are actually quite steady at around 400 pairs. Breeding success has been low since around 1997 and breeding density may be at or near its maximum. The population may even decrease. Meanwhile Arctic skuas and kittiwakes have declined with prey resource being the most likely cause.

Finally, to complete the assessment, how to conduct any control and its effects. Would new birds from the pool of non-breeders simply move into the territories vacated? Would other birds fill the vacant feeding niches, because seabirds are an attractive food resource? Should we prioritise certain individuals that particularly specialise in predating other seabirds or pursue a general cull policy? More importantly, when would know when we had succeeded? At what level would the ideal population be? These are all questions that needs answers before a control policy could be considered on such an important species at a protected site.

Research and demonstration

Noss offers a useful base for research studies as accommodation can usually be provided on the island itself. Although there has been some site-specific work, most of the studies that have been carried out on Noss have been part of Shetland-wide studies. Some examples of research projects are:

Anne Hudson, Ph.D. Univ. Glasgow	1982-84	The biology of seabirds utilising fishery waste in Shetland
Eileen Stuart	1987	A study on the effect of parental investment on the reproductive success of guillemots
David Robertson and other Glasgow Univ. students	1994-96	Study of diet of great skuas
Steve Votier, Ph.D. Univ. Glasgow	1998-2000	Great skua diet
Rebecca Nicholson – Nuffield Study Anderson High School	2010	The Abundance and Distribution of Harbour Porpoises in Selected Waters Surrounding Shetland

Ben Leonard – Aberdeen University MSc	2012	Impacts of Great Skua loafing sites on Vegetation and Invertebrates

The role of Noss as a demonstration site is limited. It does show how a large great skua population can be combined with a sheep farm, the aim of early Noss Open Days was to demonstrate this. In 1986 various trials, including egg removal and human disturbance, were carried out to examine alternatives to the then shooting of small numbers of great skuas in the Setter area, but they were not practical alternatives. Noss could be held up as an example of sustainable tourism.

Management for People

NNRs are key areas for raising awareness and increasing knowledge of Scotland's rich natural heritage. Noss is a tremendous place to visit and people can take the SNH-operated ferry across Noss Sound to land on the island, join a scheduled round-island commercial boat trip from Lerwick or, less commonly, land from their own boat, kayak etc. Cruise ships occasionally land people and several cruise operators include a Noup sail-past in their itinerary. The Noss ferry runs from late April -August though the commercial tour boats continue to go around the island all year if there is interest and conditions are suitable.

Around 1700 people currently take the Noss ferry each year and total visitor numbers, including those on one of the commercial boat trips or people from private boats/kayaks and cruise ships, may be as much as 5000 in some years.

The main type of visitor are tourists, out for a day trip. A small number of educational groups from within and outside Shetland also visit. The Reserve is also used by, for example, field studies groups and walking and specialist holiday operators. Commercial boat trips include a commentary and other information.

The Noss ferry

A 2003 visitor survey to NNRs in Shetland found that 24% were Scottish, 52% other UK and 22% overseas. The largest proportion of overseas visitors to Noss are from France and Germany.

A major annual event is the Noss Open Day which has been running since 1986. The majority of visitors that day are usually local folk and there is a distinct change in the feel of the island – various events and activities are available and free coach transport from the Lerwick-Bressay ferry is laid on. A local community group provides the catering. Visitor numbers on this day frequently surpass 300 people. SNH is dependent on 20-30 volunteers and the majority of the Shetland SNH staff to manage the event safely.

The resident seasonal site managers, are responsible for seabird monitoring but also for running the ferry and for informing visitors, – all ferry passengers receive an introductory talk in the Visitor Centre upon landing.

Noss Visitor Centre

The Centre contains a range of interpretation including panels. Reserve leaflet and bird identification bookmarks are offered free, but visitors can also purchase a 44 page souvenir booklet. The visitors leaflet has been translated into French, Italian and Norwegian

Noss is one of the most popular destinations in Shetland and is widely promoted in tourist brochures and elsewhere. During the season there are usually several media advertisements, articles and interviews with staff.

Management of the Property

Noss is managed under a Nature Reserve Agreement between the Gardie Trust and SNH. Separate agreements are in place for Gungstie, the pony pund and adjacent out buildings and for the Bressay Store, close to Noss Sound

The operation of the Noss ferry is a significant undertaking for SNH and much of the reserve infrastructure present is related to its safe operation – walkways, steps etc., as well as the boat and associated equipment. In 2009 a new jetty was constructed on the Bressay shore to improve access for visitors. There are a few stone crossing points over burns on Noss, two stiles over the Hill Dyke and some safety signs but otherwise there is a deliberately low presence of infrastructure and visitor signs away from the ferry and house area.

There is a car park at the road end on Bressay but this is not officially adopted by Shetland Islands Council.

SNH maintain all infrastructure except that which is solely related to the farming use. Half of the Pony Pund is used as a store for the Estate.

5 Document Properties

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Shetland Biological Records Centre maintain computerised Noss species lists and acknowledges the records of Roy Wattling (fungi), Kery Dalby (lichens), Walter Scott (flowering plants) and Shetland Entomological Group (invertebrates).

Photographs & maps

Photography by Lorne Gill/SNH, Juan Brown and Chris Dodd.

Maps by Eleanor Charman, SNH.

Acknowledgments

The first edition (2007) of the Story of Noss has been written by Simon Smith (Reserve Manager) and Susan Luurtsema (Managed Sites Officer) and approved by John Uttley (Area Manager).

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Links

For information about NNRs in Scotland and more information about Noss NNR please visit the Scotland's National Nature Reserves website.

For information on the protected areas associated with Noss NNR please go to the SNHi website.

Other useful links:

Scottish Natural Heritage	www.snh.org.uk
Joint Nature Conservation Committee	www.jncc.gov.uk